

APPENDIX A

Field Sampling Logs

Discrete Surface Soil Samples
Soil Boring Samples
Surface Water and Sediment Samples
August 2012 Sampling

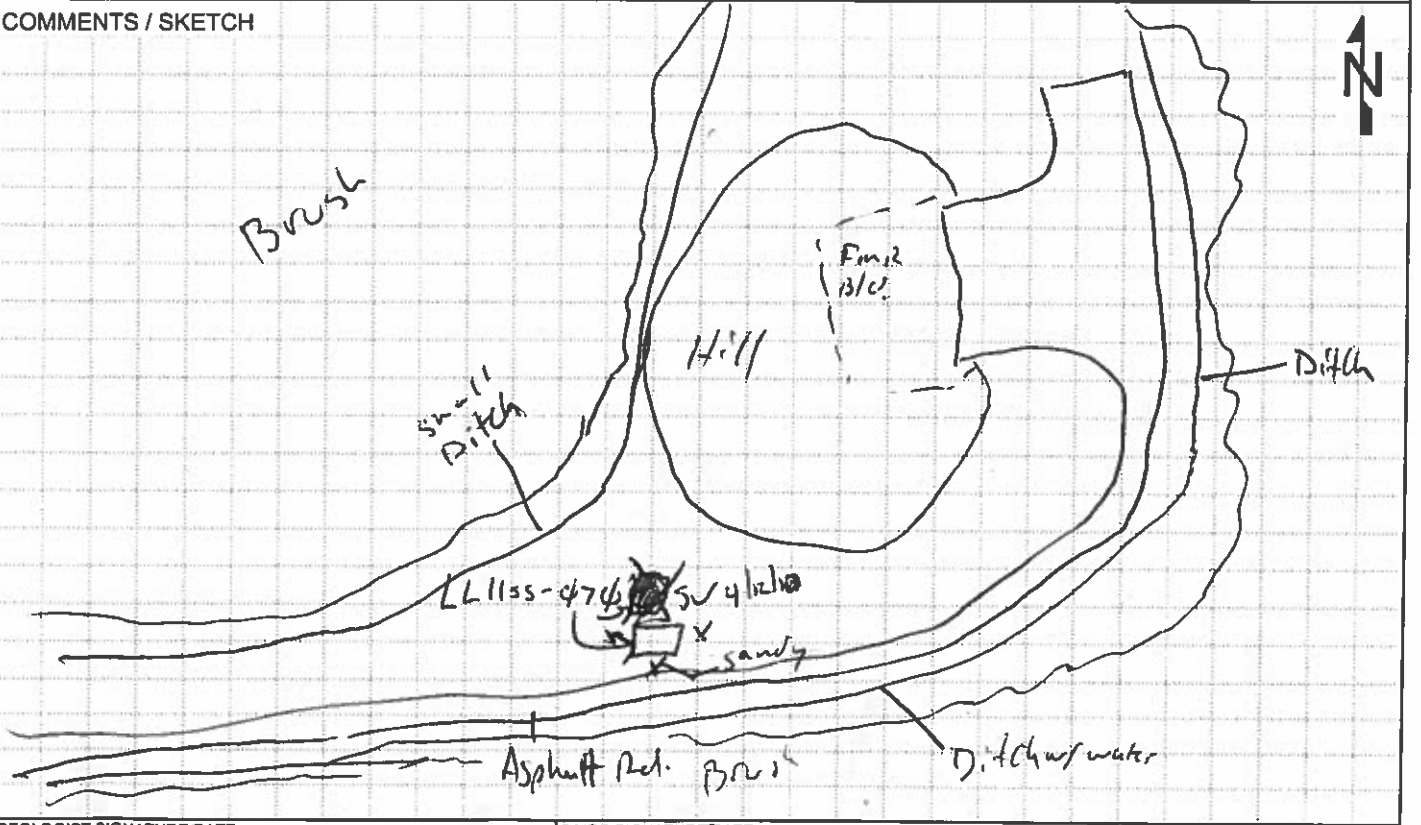
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DISCRETE SURFACE SOIL SAMPLES

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HTRW DRILLING LOG		DISTRICT USACE - Louisville	BOREHOLE NUMBER LL1155-474
1. COMPANY NAME SAIC		2. DRILLING SUBCONTRACTOR NA	SHEET 1 OF 1
3. PROJECT RVAAP PBAΦB RI		4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266	
5. NAME OF DRILLER Ryan Bourke / Emily Lunn		6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES	
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA		PID SERIAL#: NA WATER LEVEL SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 1994	

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
		ML	SILT (MC). Little fine-med sand, Trace fine gravel Sand + Gravel on subangular-sub rounded, dk gray 10Y2 4/1. Soft, damp, med. plasticity, mottled dk yellowish brown 10Y2 4/6. Trace organic (roots).	Hand Auger 4-1	NA	LL1155-474-5596-58 P4922 for metals, PAHs, PCBs + Explosives
1			Terminated Boring @ 1' BGS BORING COMPLETE USING A 3" SS HAND AUGER			



GEOLOGIST SIGNATURE/DATE BO [signature] 4/12/10	QA/QC SIGNATURE/DATE R [signature] 4/26/10	BOREHOLE NUMBER LL1155-474
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HTRW DRILLING LOG			DISTRICT		BOREHOLE NUMBER	
1. COMPANY NAME SAIC			USACE - Louisville		LL 11 ss - 471	
2. DRILLING SUBCONTRACTOR NA			SHEET 1 OF 1			
3. PROJECT RVAAP PBAB 27			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER Ryan Louch/Eun. Cunningham			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 1994			
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
		ML	SILT, little fine sand, trace clay, trace gravel (fine), trace organics (roots), dk greyish brown up to 4 1/2, soft, damp, med. plasticity			LL 11 ss - 471 - 5597-56 @ 197
		SC	Fine SAND, some silt, trace clay, trace fine gravel, loose, damp, med. plasticity, iron accumulation reddish yellow 7.5 YR 6/6 Nail in Bore hole for explosives	Hard Auger 4-4	ML	for PCB, PAHs, metals, + E. coli water
1			Terminated at 1' BGS BORING COMPLETE USING A 3" SS HAND AUGER			
COMMENTS / SKETCH <p>The sketch shows a site layout with a 'Ditch' at the top left, an 'Open field' in the center, 'Brush' and 'Trees' on the left, an 'Asphalt Rd' at the bottom, and a 'Ditch w/ water' on the right. A north arrow is in the top right corner.</p>						
GEOLOGIST SIGNATURE/DATE SC 4/12/10			QA/QC SIGNATURE/DATE RS 4/26/10		BOREHOLE NUMBER LL 11 ss - 471	

HTRW DRILLING LOG			DISTRICT USACE - Louisville		BOREHOLE NUMBER LL11SS-072	
1. COMPANY NAME SAIC			2. DRILLING SUBCONTRACTOR NA		SHEET 1 OF 1	
3. PROJECT RVAAP PBA 08, RI			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER AMANDA TRENTON/SARA HISE			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL# NA Colors from Munsell Soil Color Chart, Rev 2000 Revised WATER LEVEL SERIAL# NA			
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
			(0-1.0) SAND, medium to coarse sand; little silt; trace gravel; subangular $\leq 1"$; little fill material - brick fragments; coal; peagavel 104R413 brown; dry; loose nonplastic	NA	NA	LL11SS-072-5598 SD COLLECTED FROM 0-1 ON 04/12/10 @ 1010 FOR TOTAL + Hexavalent Chromium
	1		BOREING TERMINATED AT 1.0 FT BGS BACKFILL W/ BENTONITE CEMENT HYDRATE			
COMMENTS / SKETCH BOREING COMPLETE USING A 3" SS HAND AUGER 						
GEOLOGIST SIGNATURE/DATE Amanda Trenton 04/26/10			QA/QC SIGNATURE/DATE RS 4/26/10		BOREHOLE NUMBER LL11SS-072	

HTRW DRILLING LOG			DISTRICT USACE - Louisville		BOREHOLE NUMBER LL11SS-073	
1. COMPANY NAME SAIC			2. DRILLING SUBCONTRACTOR NA		SHEET 1 OF 1	
3. PROJECT RVAAP PBA OF RI			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER AMANDA TRENON / SALAHSE			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL#: NA WATER LEVEL SERIAL#: NA		Colors from Munsell Soil Color Chart, Rev 2000 Rev ED	
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
			(0-0.25') DECAYING ORGANICS. (0.25' - 1.0') CLAY; some silt; little fine sand; some organics throughout; dry - wet firm surface; medium stiff; highly plastic. 10YR4/3 brown; 10YR5/1 gray; + 10YR5/6 yellowish brown	NA	NA	LL11SS-073-5599-50 collected from 0-1' on 04/12/10 @ 1055 FOR HEAVY METAL + TOTAL CHROMIUM
	1					
			BORING TERMINATED AT 1.0 FT BGS BACKFILL W/ BENTONITE CHIPS + HYDRATE.			
COMMENTS / SKETCH BORING COMPLETE USING A 3" SS HAND AUGER LL11SS-073 X LL11mw-008 						
GEOLOGIST SIGNATURE/DATE Amanda Trenton 4/26/10			QA/QC SIGNATURE/DATE R. Smith 4/26/10		BOREHOLE NUMBER LL11SS-073	

HTRW DRILLING LOG			DISTRICT		BOREHOLE NUMBER	
1. COMPANY NAME SAIC			USACE - Louisville		LL155-074	
2. DRILLING SUBCONTRACTOR NA			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266		SHEET 1 OF 1	
3. PROJECT RVAAP PBA 08 RI			5. NAME OF DRILLER AMANDA TRONTON/SARA HISE			
6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED			DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL#: NA WATER LEVEL SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000 Rev ED			
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
			(0-0.75) Fill. SILT + SAND MATRIX w/ GRAVEL; BRICK; PEAGRAVEL SLAG + METAL 10YR4/3 BROWN DRY; LOOSE	NA	NA	LL155-074-5000-50 COLLECTED FROM 0-1 ON 04/12/10 @ 1430 FOR TAL METALS, PCBs, PAHs + EXPLOSIVE
	0.75		(0.75' - 1.0') Sandy Silt; trace Clay; dry; medium stiff; low plasticity; 10YR4/3 brown; 10YR5/6 yellowish brown little 10YR4/2 dark grayish brown			
	1		BORING TERMINATED AT 1.0 FT BGS BAUCFIL w/ BENTONITE CHIPS + HYDRATE			
COMMENTS / SKETCH			BORING COMPLETE USING A 3" SS HAND AUGER			
GEOLOGIST SIGNATURE/DATE Amanda Tronton 04/12/10			QA/QC SIGNATURE/DATE RS 8/4/26/10		BOREHOLE NUMBER LL155-074	

HTRW DRILLING LOG			DISTRICT USACE - Louisville		BOREHOLE NUMBER LL11SS-075	
1. COMPANY NAME SAIC			2. DRILLING SUBCONTRACTOR NA		SHEET 1 OF 1	
3. PROJECT RVAAP PBA 08 RE			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER AMANDA TRENTON/SARA HISE			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL#: NA WATER LEVEL SERIAL#: NA		Colors from Munsell Soil Color Chart, Rev 2000 REV ED	
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
			(0-1.0) SILT; LITTLE SAND; LITTLE CLAY - CLAY content slightly increases w/ depth. Dry; medium stiff. medium plastic 10YR 4/3 brown w/ little 10YR 5/6 yellowish brown. LITTLE ROOTS / ORGANICS THROUGHOUT	NA	NA	LL11SS-075-SW01- SO COLLECTED FROM 0-1 ON 04/12/10 @ 1035 FOR TOTAL & HEXAVALENT Chromium
	1		BORING TERMINATED AT 1.0 FT BGS BACKFILLED W/ BENTONITE CHIPS + HYDRATE			
COMMENTS / SKETCH			BORING COMPLETE USING A 3" SS HAND AUGER			
GEOLOGIST SIGNATURE/DATE Amanda Trenton			QA/QC SIGNATURE/DATE RS 4/26/10		BOREHOLE NUMBER LL11SS-075	

HTRW DRILLING LOG			DISTRICT		BOREHOLE NUMBER	
1. COMPANY NAME			USACE - Louisville		LL1155-076	
SAIC			2. DRILLING SUBCONTRACTOR		SHEET 1 OF 1	
3. PROJECT			4. LOCATION			
RVAAP PBAΦ8 R.E			RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER			6. DIRECTION OF BOREHOLE			
Ryan Lovich / Emily Lunn			<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES			Colors from Munsell Soil Color Chart, Rev			
PID MAKE/MODEL:			PID SERIAL#:		WATER LEVEL MAKE/MODEL:	
NA			NA		NA	
WATER LEVEL MAKE/MODEL:			WATER LEVEL SERIAL#:		1594	
NA			NA		1594	
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
			SILT, Some Fine Sand, Dk Grayish Brown 10YR 4/2, soft, low plasticity, Trace organics (roots) Trace coarse gravel.			LL1155-076-5602-S0 LL1155-076-6183-F LL1155-076-6182-G @1420 for metals, PAHs, + PCBs Explosives N 557992.09' E 2352102.29' elev. 971.50'
		ML	SILT (ML), little fine sand, Trace med. Angular Gravel, Trace Clay, et. Olive Brown 2.5Y 5/3, soft, damp, highly plastic, mottled yellowish brown 10YR 5/8.	Hand Auger 0-1	NA	
	1					
			Terminated Boring at 1' BGS BORING COMPLETE USING A 3" SS HAND AUGER			

COMMENTS / SKETCH

GEOLOGIST SIGNATURE/DATE		QA/QC SIGNATURE/DATE		BOREHOLE NUMBER	
4/12/10		4/26/10		LL1155-076	

HTRW DRILLING LOG

DISTRICT

USACE - Louisville

BOREHOLE NUMBER

LL 1155-077

1. COMPANY NAME

SAIC

2. DRILLING SUBCONTRACTOR

NA

SHEET 1 OF 1

3. PROJECT

RVAAP PBA48 RI

4. LOCATION

RVAAP 8451 State Route 5 Ravenna, OH 44266

5. NAME OF DRILLER

Ryan Kaurich / Rich Sprinzel

6. DIRECTION OF BOREHOLE

☒ VERTICAL

☐ INCLINED

DEGREES

7. NOTES

PID MAKE/MODEL: NA

PID SERIAL#: NA

Colors from Munsell Soil Color Chart, Rev

WATER LEVEL MAKE/MODEL: NA

WATER LEVEL SERIAL#: NA

1994

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
		SC	Fine, SAND, Trace Silt, Trace Fine Gravel, Dk Gray 2.5 YR 4/1, Dmp loose, moist, med. Plasticity, 3 on Accumulation strong Brown 10YR 4/6			LL 1155-077-5643-2
		CL	CLAY, some Silt, Trace Sand Trace Fine Gravel, Light Gray 3.5 YR 4/1 Drown 10YR 6/2, soft, med. Plasticity, Dmp, mottled reddish yellow 7.5 YR 6/8.	Hand Auger 4'1"	NA	<p> @ 1330 for metals, PATHS, PCBs + Explosives. </p> <p> N 558343.30' E 2352464.85' elev. 961.20 </p>
	1					
			Terminated Boring at 1' BG-3 BORING COMPLETE USING A 3" SS HAND AUGER			

COMMENTS / SKETCH



GEOLOGIST SIGNATURE/DATE

RC Vm / 4/12/16

QA/QC SIGNATURE/DATE

AS / 4/26/10

BOREHOLE NUMBER

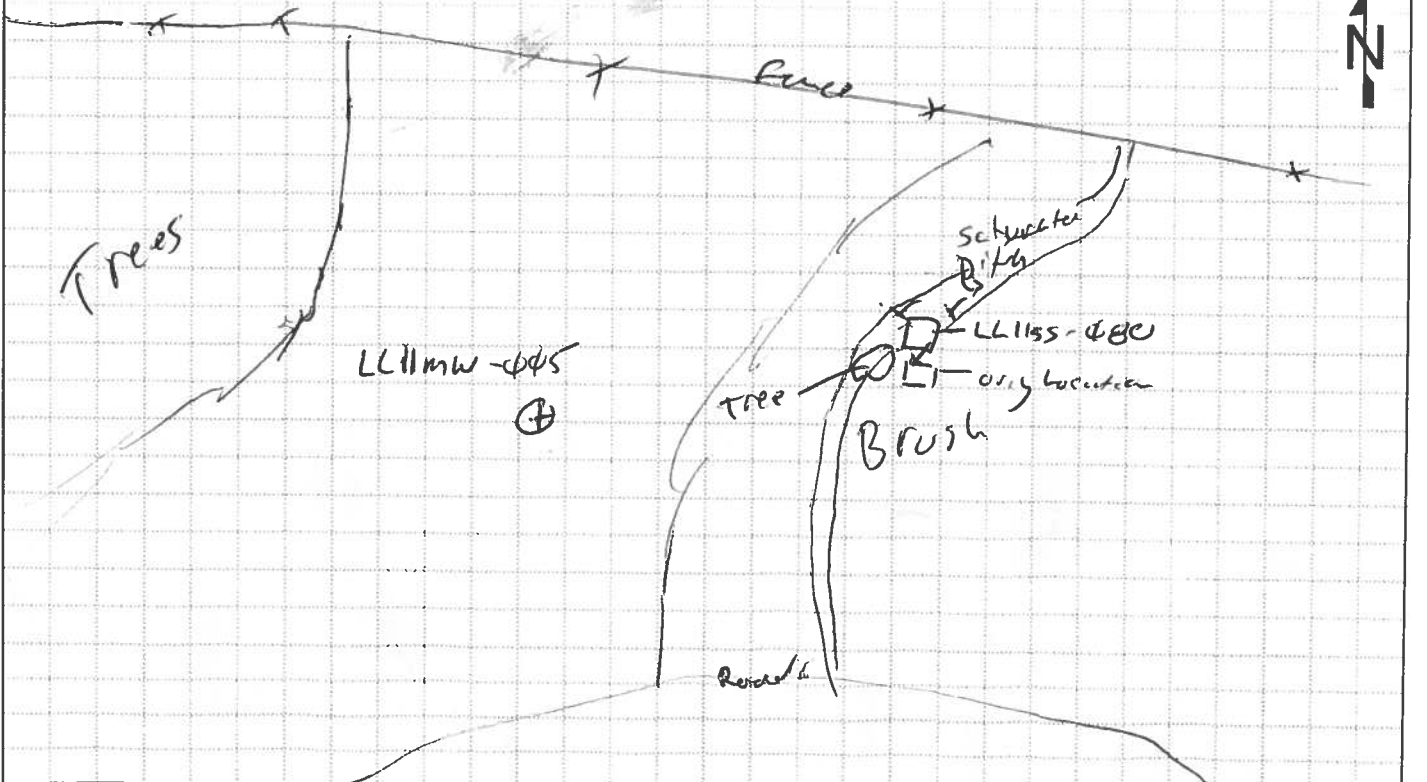
LL 1155-077

HTRW DRILLING LOG			DISTRICT USACE - Louisville		BOREHOLE NUMBER LL1155-078	
1. COMPANY NAME SAIC			2. DRILLING SUBCONTRACTOR NA		SHEET 1 OF 1	
3. PROJECT PBA 08 RT			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER Ryan Lovick Family Cunningham			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 1991 WATER LEVEL SERIAL#: NA			
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
		SS 4/12/10 ML	SILT, Some fine - very fine SAND, Trace clay, Trace fine gravel, Dk Grayish Brown 10YR 4/2, Soft Damp, High plasticity, Trace organics rocks, Iron Accumulation strong Brown 10YR 6/2 5/6, 4/12/10	Hand Auger 4-1	N/A	LL1155-078-5604-50 @ 1205 ft PAHs, PCBs, Metals, Explosives
			Med. SAND, Trace SILT, Trace fine gravel, Lt. Olive Brown 2.5Y 5/3, loose, moist, nonplastic			N 558225.89° E 2352419.65° elev. 971.46°
1			Terminated Boring @ 1' BG's BORING COMPLETE USING A 3" SS HAND AUGER			
COMMENTS / SKETCH 						
GEOLOGIST SIGNATURE/DATE SC 4/12/10			QA/QC SIGNATURE/DATE RS 4/26/10		BOREHOLE NUMBER LL1155-078	

HTRW DRILLING LOG			DISTRICT USACE - Louisville		BOREHOLE NUMBER LL 1155-479	
1. COMPANY NAME SAIC			2. DRILLING SUBCONTRACTOR NA		SHEET 1 OF 1	
3. PROJECT RVAAP PBAQ8 RF			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER Ryan Luvrick / Emily Cunningham			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL#: NA WATER LEVEL SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 1994			
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
		MC	<p>SILT (ML), some fine sand, Trace fine gravel, Grayish Brown 10YR 5/2 - 10YR 5/1.6 4/2, soft, damp, low plasticity (Trace organic / roots).</p> <p>Very fine SAND, little silt, Trace clay, Trace fine gravel, Low sp, damp, 5/4/10 = Low plasticity Brown accumulation Brownish yellow 10YR 6/6</p>	Hand Auger 4-1	NA	<p>LL1155-479-5645-50 @ 1145 + 115/115 D for recs, SVOCs, Pesticides, PCBs, & TAL metals + Hg, Propellants, Explosives</p>
	1		<p>Terminated Boring at 1' BGS. BORING COMPLETE USING A 3" SS HAND AUGER</p>			
<p>COMMENTS / SKETCH</p>						
GEOLOGIST SIGNATURE/DATE JL Wray 4/12/10			QA/QC SIGNATURE/DATE R. Smith 4/26/10		BOREHOLE NUMBER LL 1155-479	

HTRW DRILLING LOG			DISTRICT USACE - Louisville		BOREHOLE NUMBER LL1155-480	
1. COMPANY NAME SAIC			2. DRILLING SUBCONTRACTOR NA		SHEET 1 OF 1	
3. PROJECT RVAAP PBA48 Rt			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER Ryan Louwrich/Emily Cunningham			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: WATER LEVEL MAKE/MODEL:			PID SERIAL#: Colors from Munsell Soil Color Chart, Rev WATER LEVEL SERIAL#:			
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
		ML	SILT (ML), Trace Fine Sand, Trace Fine Gravel, Dk Gray to black, Very soft, moist, Highly Plastic Trace organics (roots)	Hard Auger 4-1	NA	LL1155-480-5046-50 @ 11.05 ft Explosives, metals PACs + PCBs N 552,574.12' E 2353412.41' elev. 954.64'
	1		Terminated Boring at 1' BGS, BORING COMPLETE USING A 3" SS HAND AUGER			

COMMENTS / SKETCH



GEOLOGIST SIGNATURE/DATE [Signature] 4/12/10	QA/QC SIGNATURE/DATE [Signature] 5/11/10	BOREHOLE NUMBER LL1155-480
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HTRW DRILLING LOG			DISTRICT USACE - Louisville		BOREHOLE NUMBER LL11SS- 481	
1. COMPANY NAME SAIC			2. DRILLING SUBCONTRACTOR NA		SHEET 1 OF 1	
3. PROJECT PBA08-RJ			4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266			
5. NAME OF DRILLER Ryan Louick / Emily Cunningham			6. DIRECTION OF BOREHOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEGREES			
7. NOTES PID MAKE/MODEL: NA WATER LEVEL MAKE/MODEL: NA			PID SERIAL#: NA WATER LEVEL SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 1994			
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	SPT DATA (0.5 Feet)	MONITORING (PPM/CPM)	REMARKS (Sample IDs/Depths/Core Box/Etc.)
		ML	SILT (ML), Little Fine Sand Trace Gravel, DK Gray 10YR 4/1, Soft, moist, low plasticity, Trace organics (roots), Free-sol Plastic (Explosives bore hole) 4/12/10	Hand Auger 4-1	NA	LL11SS- 481 -5607-50 @ 4950 for Metals, Explosives PABs + PABs N 550500.98 E 2353463.36 elv. 958.12
1			Terminated Bore @ 1' BGS BORING COMPLETE USING A 3" SS HAND AUGER			

COMMENTS / SKETCH



GEOLOGIST SIGNATURE/DATE <i>[Signature]</i> 4/12/10	QA/QC SIGNATURE/DATE <i>[Signature]</i> 5/11/10	BOREHOLE NUMBER LL11SS- 481
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SOIL BORING SAMPLES

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HTRW DRILLING LOG

DISTRICT

USACE - Louisville

BOREHOLE NUMBER

LL15B-060

1. COMPANY NAME

SAIC

2. DRILLING SUBCONTRACTOR

Frontz Drilling

SHEET 1 OF 2

3. PROJECT

RVAAP R3A 08 RE

4. LOCATION

RVAAP 8451 State Route 5 Ravenna, OH 44266

5. NAME OF DRILLER

JEREMY LECKRONE

7. SIZES AND TYPES OF SAMPLING EQUIPMENT

3" x 1' HAND AUGER
1.5" x 4' ACETATE LINER
2" x 4' DUAL TUBE

6. MAKE/MODEL OF DRILL

Geoprobe 0020DT

8. BOREHOLE LOCATION

557534.13' E-2352824.39'

9. SURFACE ELEVATION/DATUM

977.89' NAD83

10. DRILL DATE/TIME

STARTED: 03/18/10 1520

COMPLETED: 1620

15. DEPTH GROUNDWATER ENCOUNTERED

16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION

NA

12. OVERBURDEN THICKNESS

> 13 FT

13. DEPTH DRILLED INTO BEDROCK

NA

14. TOTAL DEPTH OF BOREHOLE

13 FT

18. GEOTECHNICAL SAMPLES

UNDISTURBED: _____

DISTURBED: _____

19. TOTAL NUMBER OF CORE BOXES

NA

20. CHEMICAL SAMPLES

CHEM: MET/PAH/PCB/DPAD: _____

NA

OTHER: _____

21. TOTAL CORE RECOVERY %

NA

22. DISPOSITION OF BOREHOLE

DATE STARTED/INSTALLED: 03/18/10; 1520

DATE COMPLETED/ABANDONED: 03/18/10; 1620

BACKFILL TYPE:

☐ GROUT

☒ BENTONITE

☐ TEMPORARY WELL POINT

☐ MONITORING WELL

23. NOTES

BKG: ≤ Background

BGS: Below Ground Surface

CPM: Counts per Minute

PPM: Parts per Million

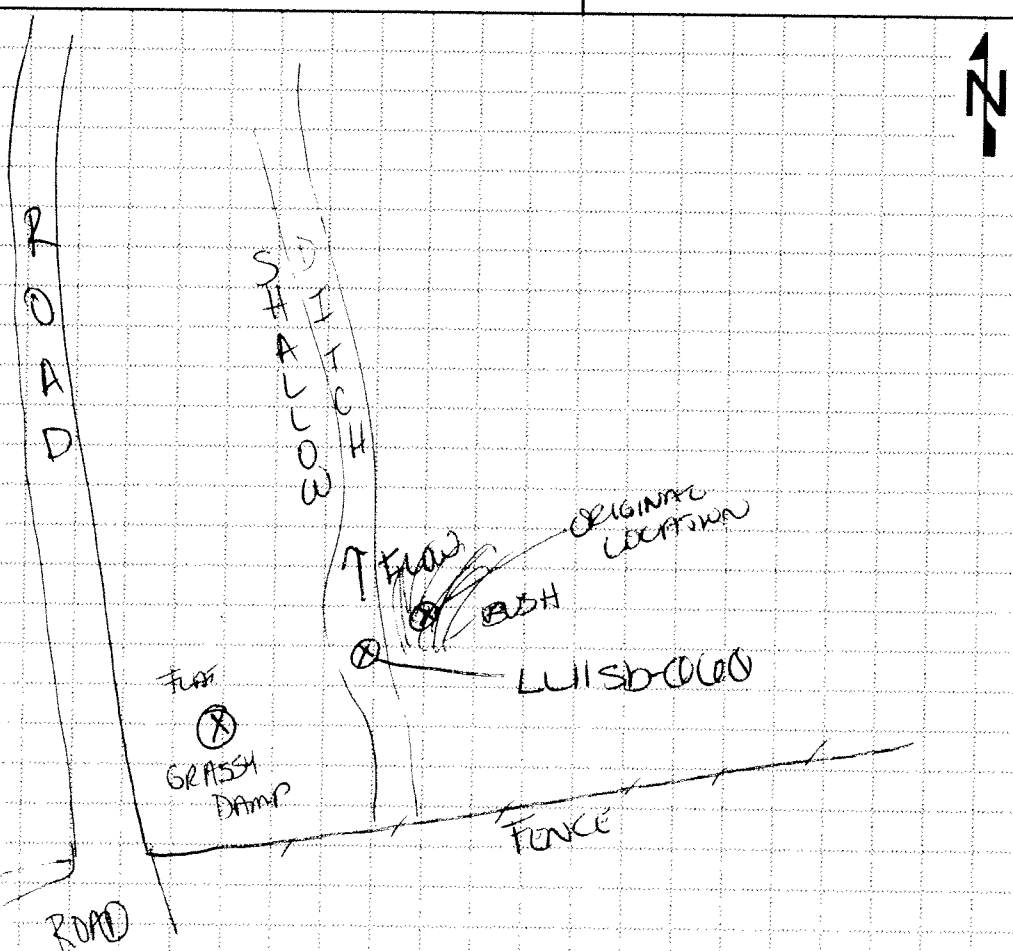
▽ : First Water Encountered

▼ : Static Water Level

NA: Not Applicable

LOCATION SKETCH/COMMENTS

SCALE: None



GEOLOGIST SIGNATURE/DATE

Mandana Norton 03/18/10

QA/QC SIGNATURE/DATE

RE 5/15/10

BOREHOLE NUMBER

LL15B-060



RVAAP-44
Load Line 11
LL11sb-060

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/18/10; 1520
End Date : 03/18/10; 1620
Northing Coord. : 557534.13
Easting Coord. : 2352824.39
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	ML		(0.0' - 0.6') SILT (ML); 10YR3/2 dark grayish brown; loose; wet; low plasticity; significant roots and organics throughout.	LL11sb-060-5551-SO collected from 0.0' - 1.0' on 03/18/10 at 1540 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
1	CL		(0.6' - 3.0') CLAY (CL); some Silt; 10YR5/6 yellowish brown and 2.5Y7/1 light gray; medium stiff; dry, exterior is wet from surface water; high plasticity.	LL11sb-060-5552-SO collected from 1.0' - 4.0' on 03/18/10 at 1555 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.6'/3.0'		
2			(2.0' - 3.0') Stiff.				
3			(3.0' - 5.2') Very fine grained SAND (SW); 10YR5/6 yellowish brown and 10YR5/1 gray; medium dense; dry; nonplastic.	LL11sb-060-5553-SO collected from 4.0' - 7.0' on 03/18/10 at 1603 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	3.1'/3.0'		
4	SW		(4.0') Introduction of trace 1" subrounded Gravel.				
5			(4.8 - 5.2') Wet.	LL11sb-060-5554-SO collected from 7.0' - 13.0' on 03/18/10 at 1615 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.7'/3.0'		
6	SM		(5.2' - 5.75') Medium grained SAND (SM); little Silt; trace Gravel, 1/4", subangular; 10YR5/4 yellowish brown; medium dense; wet.				
7			(5.75' - 10.85') Very fine grained SAND (SM); little Silt; little Gravel, 1/4", subangular; 10YR5/4 yellowish brown; medium stiff; damp to dry; nonplastic. Silt content increases with depth.				
8	SM						
9							
10							
11			(10.85' - 13.0') SILT (ML); little Sand; trace Clay; 10YR5/4 yellowish brown; medium stiff; damp; low plasticity.				
12	ML		(11.8' - 13.0') Silt is 10YR5/1 gray.				
13			Boring terminated at 13.0 ft bgs.				Coordinate System: NAD 83

Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses.

LL11sb-060

HTRW DRILLING LOG

DISTRICT

USACE - Louisville

BOREHOLE NUMBER

LUISB-001

1. COMPANY NAME

SAIC

2. DRILLING SUBCONTRACTOR

Frontz Drilling

SHEET 1 OF 2

3. PROJECT

RVAAP PBA OS RI

4. LOCATION

RVAAP 8451 State Route 5 Ravenna, OH 44266

5. NAME OF DRILLER

JEREMY LECKRONE

6. MAKE/MODEL OF DRILL

Geoprobe 6020 DT

7. SIZES AND TYPES OF SAMPLING EQUIPMENT

3" x 1' HAND AUGER
1.5" x 4' ACETATE LINER
2" x 4' DUAL TUBE

8. BOREHOLE LOCATION

N. 557899.78 E 2352718.7739'

9. SURFACE ELEVATION/DATUM

NAD 83

10. DRILL DATE/TIME

STARTED: 5:30

COMPLETED: 1:25

15. DEPTH GROUNDWATER ENCOUNTERED

NA

16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION

NA

12. OVERBURDEN THICKNESS

213 FT

13. DEPTH DRILLED INTO BEDROCK

NA

14. TOTAL DEPTH OF BOREHOLE

13 FT

17. OTHER WATER LEVEL MEASUREMENTS (INCLUDE DATE/TIME)

NA

18. GEOTECHNICAL SAMPLES

UNDISTURBED: _____

DISTURBED: _____

19. TOTAL NUMBER OF CORE BOXES

NA

20. CHEMICAL SAMPLES

CHEM MET/ENV/HH/KG/RAD: _____

NA

OTHER: _____

21. TOTAL CORE RECOVERY %

NA

22. DISPOSITION OF BOREHOLE

DATE STARTED/INSTALLED: 03/17/10

DATE COMPLETED/ABANDONED: 03/17/10

BACKFILL TYPE:

☐ GROUT☒ BENTONITE☐ TEMPORARY WELL POINT☐ MONITORING WELL

23. NOTES

BKG: \leq Background

BGS: Below Ground Surface

CPM: Counts per Minute

PPM: Parts per Million

 ∇ : First Water Encountered \blacktriangledown : Static Water Level

NA: Not Applicable

LOCATION SKETCH/COMMENTS

SCALE: None

LUISB-001

WOODED AREA

FINE BRICK, CONCRETE + GRAVEL FRAGMENTS SCATTERED

FLAT OPEN GRASSY

ROAD

LUISB-001

GEOLOGIST SIGNATURE/DATE: Amanda Henton 03/17/10

QA/QC SIGNATURE/DATE: [Signature] 5/13/10

BOREHOLE NUMBER: LUISB-001



RVAAP-44
Load Line 11
LL11sb-061

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/17/10; 1530
End Date : 03/17/10; 1635
Northing Coord. : 557899.78
Easting Coord. : 2352718.7739
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0			(0.0' - 0.75') FILL; Sand, Silt, Gravel, building demolition debris; Silt matrix is 10YR3/2 very dark grayish brown; medium stiff; dry.	LL11sb-061-5555-SO collected from 0.0' - 1.0' on 03/17/10 at 1545 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
1	ML		(0.75' - 1.25') CLAY and SILT (ML); little Sand and Gravel; 10YR4/3 brown and 10YR4/6 yellowish brown; medium stiff; dry; medium plasticity.				
2			(1.25' - 4.7') SILT (ML); little Clay; trace fine Gravel; 10YR5/6 yellowish brown and 10YR4/3 brown; medium stiff; damp; low plasticity.	LL11sb-061-5556-SO collected from 1.0' - 4.0' on 03/17/10 at 1620 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.7'/3.0'		
3	ML						
4							
5			(4.7' - 7.3') CLAY (CL); some Silt; trace Gravel; 10YR4/4 dark yellowish brown; some iron accumulations; medium stiff; damp; low plasticity; trace Shale at 5.2'.	LL061sb-061-5557-SO collected from 4.0' - 7.0' on 03/17/10 at 1625 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.9'/3.0'		
6	CL						
7							
8	GM		(7.3' - 7.5') GRAVEL (GM); Silt matrix; 10YR4/6 dark yellowish brown; dry.				
9			(7.5' - 11.9') Very fine grained SAND (SM); some Silt; trace Gravel; 10YR5/1 gray; medium dense; damp; nonplastic.	LL11sb-061-5558-SO collected from 7.0' - 13.0' on 03/17/10 at 1635 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.3'/3.0'		
10	SM						
11							
12	ML		(11.9' - 13.0') SILT (ML); little Sand; trace Clay; 5Y5/2 olive gray; medium stiff; damp; low plasticity.		2.4'/3.0'		
13			Boring terminated at 13.0 ft bgs.				Coordinate System: NAD 83

Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses.

LL11sb-061

HTRW DRILLING LOG		DISTRICT	BOREHOLE NUMBER
1. COMPANY NAME SAIC		USACE - Louisville	LC15b-002
2. DRILLING SUBCONTRACTOR Frontz Drilling		SHEET 1 OF 2	
3. PROJECT RVAAP PBA Q8 RE		4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266	
5. NAME OF DRILLER Jeremy Lelkrope		6. MAKE/MODEL OF DRILL Geoprobe 6020DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT 3" x 1" HAND AUGER 1.5" x 4' ACETATE LINER 2" x 4' DUAL TUBE		8. BOREHOLE LOCATION N-558102.4509 E-2352689.5754	
		9. SURFACE ELEVATION/DATUM NAD 83	
		10. DRILL DATE/TIME 03/18/10 STARTED: 1300 COMPLETED: 1350	
		15. DEPTH GROUNDWATER ENCOUNTERED 6.5'	
		16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION NA	
12. OVERBURDEN THICKNESS 13+ FT		17. OTHER WATER LEVEL MEASUREMENTS (INCLUDE DATE/TIME) NA	
13. DEPTH DRILLED INTO BEDROCK NA			
14. TOTAL DEPTH OF BOREHOLE 13 FT			
18. GEOTECHNICAL SAMPLES UNDISTURBED: 2 From 85 DISTURBED: _____		19. TOTAL NUMBER OF CORE BOXES NA	
20. CHEMICAL SAMPLES CHEM: 10/1/10/10 NA OTHER: _____		21. TOTAL CORE RECOVERY % NA	
22. DISPOSITION OF BOREHOLE DATE STARTED/INSTALLED: 03/18/10; 1300 DATE COMPLETED/ABANDONED: 03/18/10; 1350			
BACKFILL TYPE: <input type="checkbox"/> GROUT <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> TEMPORARY WELL POINT <input type="checkbox"/> MONITORING WELL			
23. NOTES BKG: s Background BGS: Below Ground Surface CPM: Counts per Minute PPM: Parts per Million ▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable			
LOCATION SKETCH/COMMENTS		SCALE: None	
GEOLOGIST SIGNATURE/DATE Amanda Jenton 03/18/10		QA/QC SIGNATURE/DATE RE 5/18/10	
		BOREHOLE NUMBER LC15b-002	



RVAAP-44
Load Line 11
LL11sb-062

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/18/10; 1300
End Date : 03/18/10; 1350
Northing Coord. : 558162.4509
Easting Coord. : 2352689.5754
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	ML		(0.0' - 0.75') SILT (ML) some Clay; trace Gravel; 10YR5/4 yellowish brown, 10YR6/8 brownish yellow, and 10YR4/2 dark grayish brown; medium stiff; damp; low plasticity; significant roots throughout.	LL11sb-062-5559-SO, LL11sb-062-6189-FD, & LL11sb-062-6193-QA collected from 0.0' - 1.0' on 03/18/10 at 1310 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
1	CL		(0.75' - 2.9') CLAY (CL); some Silt; 10YR5/4 yellowish brown and 10YR4/2 dark grayish brown; medium stiff until 1.5' then stiff; dry; medium plasticity.				
2					2.8'/3.0'		
3			(2.9' - 9.2') Very fine grained SAND (SM); some Silt; trace Clay; 10YR5/4 yellowish brown; soft; damp; low plasticity; increased clay content with depth.	LL11sb-062-5560-SO collected from 1.0' - 4.0' on 03/18/10 at 1334 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.7'/3.0'		
4							
5			(4.8') Medium grained Sand lens.	LL11sb-062-5561-SO collected from 4.0' - 7.0' on 03/18/10 at 1342 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.9'/3.0'		
6	SM		(5.3') Subangular Gravel. (5.5') Subangular Gravel. (5.8') Iron staining; siltier.				
7			(6.5' - 7.2') Soft; moist; wet by 7.0' bgs.	LL11sb-062-5562-SO collected from 7.0' - 13.0' on 03/18/10 at 1348 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.6'/3.0'		
8							
9							
10	SM		(9.2' - 10.3') Medium grained SAND (SM); little Silt; 10YR5/4 yellowish brown; medium dense; moist.				
11	ML		(10.3' - 12.3') SILT and CLAY (ML); 2.5Y5/1 gray; stiff; dry; medium plasticity.				
12	ML		(12.3' - 13.0') SILT (ML); little Sand and Clay; 5Y5/2 olive gray; medium stiff; dry; low plasticity.				
13			Boring terminated at 13.0 ft bgs.				Coordinate System: NAD 83
Boring backfilled with sodium bentonite chips and hydrated. 0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP. Samples were composited and homogenized for all analyses.					LL11sb-062		

RVAAP-44
Load Line 11
LL11sb-085

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/18/10; 1350
End Date : 03/18/10; 1440
Northing Coord. : 558162.4509
Easting Coord. : 2352689.5754
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	ML		(0.0' - 0.75') SILT (ML) some Clay; trace Gravel; 10YR5/4 yellowish brown, 10YR6/8 brownish yellow, and 10YR4/2 dark grayish brown; medium stiff; damp; low plasticity; significant roots throughout.				Soil Color Chart Munsell 2000 Rev. Ed.
1	CL		(0.75' - 2.9') CLAY (CL); some Silt; 10YR5/4 yellowish brown and 10YR4/2 dark grayish brown; medium stiff until 1.5' then stiff; dry; medium plasticity.				
2				Shelby Tube LL11sb-085-5567 collected from 2.0' - 3.9' at 1430 for Porosity, Bulk Density, Moisture Content, Total Organic Carbon, Permeability, and Grain Size Fraction Analysis.	1.9/2.0'		
3			(2.9' - 9.2') Very fine grained SAND (SM); some Silt; trace Clay; 10YR5/4 yellowish brown; soft; damp; low plasticity; increased clay content with depth.				
4				Shelby Tube LL11sb-085-5568 collected from 4.0' - 5.5' at 1440 for Porosity, Bulk Density, Moisture Content, Total Organic Carbon, Permeability, and Grain Size Fraction Analysis.	1.5/2.0'		
5			(4.8') Medium grained Sand lens.				
6	SM		(5.3') Subangular Gravel. (5.5') Subangular Gravel. (5.8') Iron staining; siltier.				
7			(6.5' - 7.2') Soft; moist; wet by 7.0' bgs.				
8							
9							
10	SM		(9.2' - 10.3') Medium grained SAND (SM); little Silt; 10YR5/4 yellowish brown; medium dense; moist.				
11	ML		(10.3' - 12.3') SILT and CLAY (ML); 2.5Y5/1 gray; stiff; dry; medium plasticity.				
12	ML		(12.3' - 13.0') SILT (ML); little Sand and Clay; 5Y5/2 olive gray; medium stiff; dry; low plasticity.				
13			Boring terminated at 13.0 ft bgs.				Coordinate System: NAD 83
Boring backfilled with sodium bentonite chips and hydrated. Shelby tubes sealed with wax and capped.					LL11sb-085		

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HTRW DRILLING LOG		DISTRICT USACE - Louisville	BOREHOLE NUMBER LL11SB-003
1. COMPANY NAME SAIC		2. DRILLING SUBCONTRACTOR Frontz Drilling	
3. PROJECT RVAAP PBA 08 RI		4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266	
5. NAME OF DRILLER JEREMY LEKRONE		6. MAKE/MODEL OF DRILL NA Geoprobe 2L 5/17/10	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT 3" x 1' HAND AUGER		8. BOREHOLE LOCATION N-557777.40' E-7352343.29 ft	
		9. SURFACE ELEVATION/DATUM NA 83, 970 ft	
		10. DRILL DATE/TIME 03/22/10 STARTED: 1505 COMPLETED: 1600	
		15. DEPTH GROUNDWATER ENCOUNTERED SURFACE WATER	
12. OVERBURDEN THICKNESS 75 FT		16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION NA	
13. DEPTH DRILLED INTO BEDROCK NA		17. OTHER WATER LEVEL MEASUREMENTS (INCLUDE DATE/TIME) NA	
14. TOTAL DEPTH OF BOREHOLE 5 FT			
18. GEOTECHNICAL SAMPLES UNDISTURBED: _____ DISTURBED: _____		19. TOTAL NUMBER OF CORE BOXES NA	
20. CHEMICAL SAMPLES CHEM: CR4107/11 #1/14 RAD: NA OTHER: _____		21. TOTAL CORE RECOVERY % NA	
22. DISPOSITION OF BOREHOLE DATE STARTED/INSTALLED: 03/22/10; 1505 DATE COMPLETED/ABANDONED: 03/22/10; 1600			
BACKFILL TYPE: <input type="checkbox"/> GROUT <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> TEMPORARY WELL POINT <input type="checkbox"/> MONITORING WELL			
23. NOTES BKG: ≤ Background BGS: Below Ground Surface CPM: Counts per Minute PPM: Parts per Million ▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable			
LOCATION SKETCH/COMMENTS			SCALE: None
GEOLOGIST SIGNATURE/DATE <i>Amanda Shenton</i> 03/22/10		QA/QC SIGNATURE/DATE <i>RE</i> 5/13/10	
		BOREHOLE NUMBER LL11SB-003	



**US Army Corps
of Engineers®**
Louisville District



RVAAP-44
Load Line 11
LL11sb-063

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : NA
Type of Drill Rig : NA
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 3"
Sampling Equipment : 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/22/10; 1505
End Date : 03/22/10; 1600
Northing Coord. : 557777.46
Easting Coord. : 2352363.29
Total Depth of Boring : 5.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	SM		(0.0' - 0.75') SAND (SM); some Silt; some angular Gravel; some asphalt; 10YR3/3 dark brown; loose; wet from water in ditch; significant organics throughout. Silt content increases with depth.	LL11sb-063-5563-SO collected from 0.0' - 1.0' on 03/22/10 at 1530 for TAL Metals + Hg, PCBs, PAHs, and Explosives. LL11sb-063-5564-SO collected from 1.0' - 4.0' on 03/22/10 at 1545 for TAL Metals + Hg, PCBs, PAHs, and Explosives. LL11sb-063-5565-SO collected from 4.0' - 5.0' on 03/22/10 at 1555 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'	1.0'	Soil Color Chart Munsell 2000 Rev. Ed.
1	ML		(0.75' - 2.5') SILT (ML); some Sand; 10YR5/4 yellowish brown; medium stiff; dry; low plasticity.				
3	CL		(2.5' - 4.0') CLAY (CL); some Silt; little Sand; 10YR5/4 yellowish brown; medium stiff; dry, wet from water in ditch; medium plasticity.				
4	ML		(4.0' - 5.0') SILT (ML); little Clay; trace fine Gravel; 10YR5/4 yellowish brown; medium stiff; dry, moist from water in ditch; low plasticity.				
5			Boring terminated at 5.0 ft bgs. Hand Auger Refusal.				
6							
7							
Boring backfilled with sodium bentonite chips and hydrated. 0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP. Samples were composited and homogenized for all analyses.					LL11sb-063		

Coordinate System: NAD 83

HTRW DRILLING LOG

DISTRICT

USACE - Louisville

BOREHOLE NUMBER

LL15B-004

1. COMPANY NAME

SAIC

2. DRILLING SUBCONTRACTOR

Frontz Drilling

SHEET 1 OF 2

3. PROJECT

RVAAP PBA OS R

4. LOCATION

RVAAP 8451 State Route 5 Ravenna, OH 44266

5. NAME OF DRILLER

JEREMY LELAND

6. MAKE/MODEL OF DRILL

Geoprobe 6020 DT

7. SIZES AND TYPES OF SAMPLING EQUIPMENT

3" x 1' HAND LUGER
1.5" x 4' ACETATE LINER
2" x 4' DUAL TUBE

8. BOREHOLE LOCATION

N-558223.8434 E-2352530.9670

9. SURFACE ELEVATION/DATUM

NAD 83

10. DRILL DATE/TIME

STARTED: 1100

COMPLETED: 1145

15. DEPTH GROUNDWATER ENCOUNTERED

4.7'

16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION

NA

12. OVERBURDEN THICKNESS

213 FT

13. DEPTH DRILLED INTO BEDROCK

NA

14. TOTAL DEPTH OF BOREHOLE

13 FT

17. OTHER WATER LEVEL MEASUREMENTS (INCLUDE DATE/TIME)

NA

18. GEOTECHNICAL SAMPLES

UNDISTURBED: _____

DISTURBED: _____

19. TOTAL NUMBER OF CORE BOXES

NA

20. CHEMICAL SAMPLES

CHEM: M/LR/PA/RB RAD: NA

OTHER: _____

21. TOTAL CORE RECOVERY %

NA

22. DISPOSITION OF BOREHOLE

DATE STARTED/INSTALLED: 03/18/10; 1100

DATE COMPLETED/ABANDONED: 03/18/10; 1145

BACKFILL TYPE:

☐ GROUT

☒ BENTONITE

☐ TEMPORARY WELL POINT

☐ MONITORING WELL

23. NOTES

BKG: ≤ Background

BGS: Below Ground Surface

CPM: Counts per Minute

PPM: Parts per Million

▽ : First Water Encountered

▼ : Static Water Level

NA: Not Applicable

LOCATION SKETCH/COMMENTS

SCALE:

None

① - LL1mw-000

FLAT; DRY

ASPHALT

② - LL15B-004

GRASS

GRASS

GEOLOGIST SIGNATURE/DATE

Amanda Venton 03/18/10

QA/QC SIGNATURE/DATE

[Signature] 5/13/10

BOREHOLE NUMBER

LL15B-004



**US Army Corps
of Engineers®**
Louisville District



RVAAP-44
Load Line 11
LL11sb-064

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/18/10; 1100
End Date : 03/18/10; 1145
Northing Coord. : 558223.8434
Easting Coord. : 2352530.9676
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0			(0.0' - 0.35') Asphalt.				Soil Color Chart Munsell 2000 Rev. Ed. Asphalt and sub-base not included in 0-1 sample. Explosives sample collected from triangulated A, B, & C. Other analytes collected from center borehole D.
			(0.35' - 0.5') Gravel Sub-base.				
1	SW		(0.5' - 1.5') Medium grained SAND (SW/Fill); 7.5YR4/4 brown; medium dense; damp to moist; nonplastic.	LL11sb-064-5569-SO collected from 0.0' - 1.0' on 03/18/10 at 1108 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	A 0.9'/1.0' B 0.85'/1.0' C 0.8'/1.0' D 0.75'/1.0'		
2			(1.5' - 4.7') Very fine grained SAND and SILT (SM); 10YR5/4 yellowish brown; medium dense; damp to dry.	LL11sb-064-5570-SO collected from 1.0' - 4.0' on 03/18/10 at 1120 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.9'/3.0'		
3	SM						Coordinate System: NAD 83
4							
5			(4.7' - 12.6') Very fine grained SAND (SW); 10YR5/4 yellowish brown; medium dense; wet; nonplastic. Silt content increases with depth.	LL11sb-064-5571-SO and MS/MSD collected from 4.0' - 7.0' on 03/18/10 at 1126 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.9'/3.0'		
6							
7							Coordinate System: NAD 83
8							
9	SW				2.85'/3.0'		
10							
11				LL11sb-064-5572-SO, LL11sb-064-6188-FD, & LL11sb-064-6192-QA collected from 7.0' - 13.0' on 03/18/10 at 1137 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	3.0'/3.0'		Coordinate System: NAD 83
12							
13	CL		(12.6' - 13.0') CLAY (CL); some Silt; 2.5Y5/1 gray; medium stiff; dry; medium plasticity.				
			Boring terminated at 13.0 ft bgs.				

Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses.
Twin boreholes were drilled to obtain volume required for analyses.

LL11sb-064

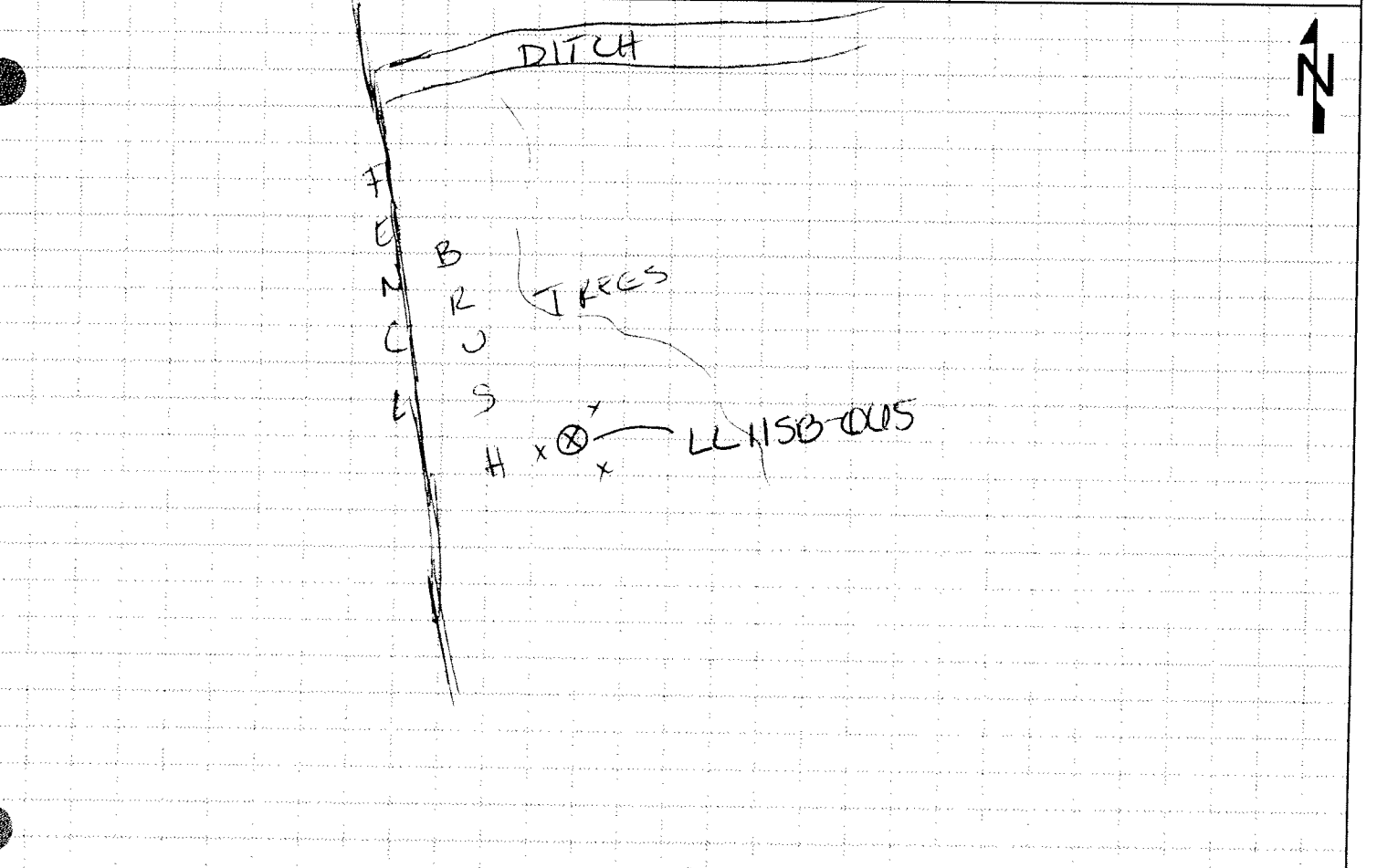
HTRW DRILLING LOG

DISTRICT USACE - Louisville	BOREHOLE NUMBER LL15B-065
1. COMPANY NAME SAIC	2. DRILLING SUBCONTRACTOR Frontz Drilling
SHEET 1 OF 2	

3. PROJECT RVAAP PBA 08 RI	4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266
5. NAME OF DRILLER JEREMY LECKRONE	6. MAKE/MODEL OF DRILL Geoprobe 6020 DT
7. SIZES AND TYPES OF SAMPLING EQUIPMENT 3" x 1" HAND AUGER 1.5" x 4' ACETATE LINER 2" x 4' DUAL TUBE	8. BOREHOLE LOCATION N-557475.7402 E-2357867.0391
	9. SURFACE ELEVATION/DATUM NAD 83
	10. DRILL DATE/TIME 03/22/10 STARTED: 0910 COMPLETED: 1005
	15. DEPTH GROUNDWATER ENCOUNTERED NA
	16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION NA
12. OVERBURDEN THICKNESS 13+ FT	17. OTHER WATER LEVEL MEASUREMENTS (INLCUDE DATE/TIME) NA
13. DEPTH DRILLED INTO BEDROCK NA	
14. TOTAL DEPTH OF BOREHOLE 13 FT	

18. GEOTECHNICAL SAMPLES UNDISTURBED: NA DISTURBED: NA	19. TOTAL NUMBER OF CORE BOXES NA
20. CHEMICAL SAMPLES CHEM: GFA/MST RAD: NA OTHER: —	21. TOTAL CORE RECOVERY % NA
22. DISPOSITION OF BOREHOLE DATE STARTED/INSTALLED: 03/22/10, 0910 DATE COMPLETED/ABANDONED: 03/22/10, 1005	
BACKFILL TYPE: <input type="checkbox"/> GROUT <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> TEMPORARY WELL POINT <input type="checkbox"/> MONITORING WELL	
23. NOTES BKG: ≤ Background BGS: Below Ground Surface CPM: Counts per Minute PPM: Parts per Million ▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable	

LOCATION SKETCH/COMMENTS	SCALE: None
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GEOLOGIST SIGNATURE/DATE Amanda Venton 03/22/10	QA/QC SIGNATURE/DATE [Signature] 5/13/10	BOREHOLE NUMBER LL15B-065
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RVAAP-44
Load Line 11
LL11sb-065

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/22/10; 0910
End Date : 03/22/10; 1005
Northing Coord. : 557475.7402
Easting Coord. : 2351867.0397
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	ML		(0.0' - 0.25') SILT (ML); 10YR4/2 dark grayish brown; loose; wet from rain; organics throughout.	LL11sb-065-5573-SO collected from 0.0' - 1.0' on 03/22/10 at 0925 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
1			(0.25' - 3.8') CLAY (CL); some Silt; little fine to medium grained Sand; 10YR5/6 yellowish brown, 2.5Y6/1 gray, and 10YR5/3 brown; soft; damp; medium plasticity. (1.5 - 3.8') Medium stiff.	LL11sb-065-5574-SO collected from 1.0' - 4.0' on 03/22/10 at 0935 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.9'/3.0'		
2	CL		Siltier with depth.				
3							
4			(3.8' - 12.8') SILT (ML); some fine grained Sand lenses; little Clay; little Gravel, <1/2", subangular; 10YR5/4 yellowish brown and 2.5Y6/1 gray; medium stiff; dry.	LL11sb-065-5575-SO collected from 4.0' - 7.0' on 03/22/10 at 0954 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.55'/3.0'		
5							Coordinate System: NAD 83
6							
7	ML						
8							
9							
10			(9.8' - 12.8') Medium grained SAND (SW); little Silt; 10YR5/4 yellowish brown; medium stiff; damp.	LL11sb-065-5576-SO collected from 7.0' - 13.0' on 03/22/10 at 1004 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.05'/3.0'		
11	SW						
12							
13	ML		(12.8' - 13.0') SILT (ML); little Sand; trace Clay; 2.5Y5/1 gray; medium stiff; damp; low plasticity.				
			Boring terminated at 13.0 ft bgs.				

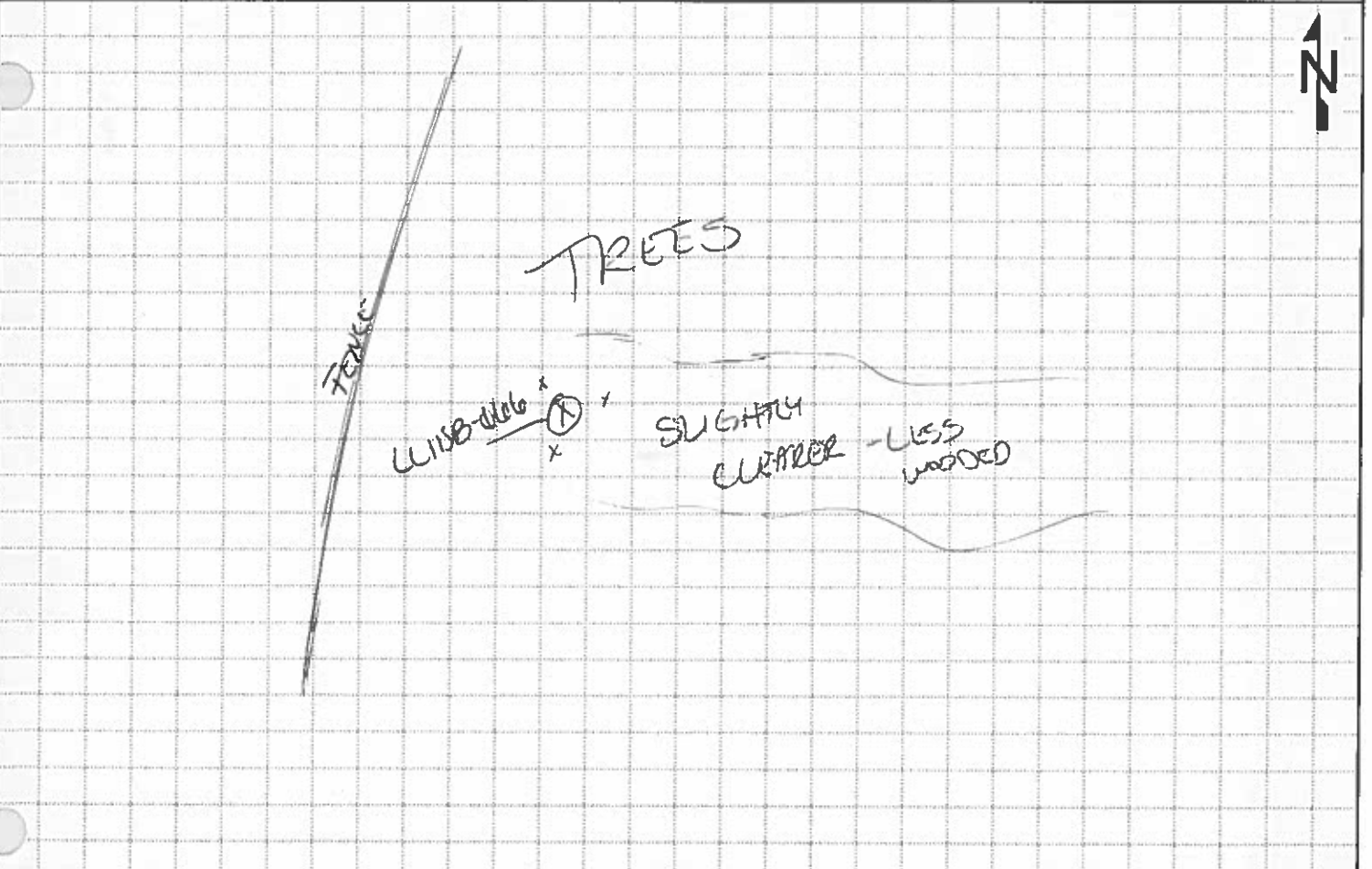
Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses.

LL11sb-065

HTRW DRILLING LOG

DISTRICT USACE - Louisville		BOREHOLE NUMBER LL11SB-066
1. COMPANY NAME SAIC		2. DRILLING SUBCONTRACTOR Frontz Drilling
3. PROJECT RVAAP PBA 08 RI		4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266
5. NAME OF DRILLER JEREMY COLLINS		6. MAKE/MODEL OF DRILL Geoprobe 0020 JT
7. SIZES AND TYPES OF SAMPLING EQUIPMENT 3" x 1' HAND AUGER 1.5" x 4' ARETATE LINER 2" x 4' DUAL TUBE		8. BOREHOLE LOCATION 557851.8602' E-2351064.1270'
		9. SURFACE ELEVATION/DATUM NAD 83
		10. DRILL DATE/TIME 03/22/10 STARTED: 1045 COMPLETED: 1145
		11. DEPTH GROUNDWATER ENCOUNTERED 9 FT
		12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION NA
13. OVERBURDEN THICKNESS 13 FT		17. OTHER WATER LEVEL MEASUREMENTS (INCLUE DATE/TIME) NA
14. DEPTH DRILLED INTO BEDROCK NA		
15. TOTAL DEPTH OF BOREHOLE 13 FT		
18. GEOTECHNICAL SAMPLES UNDISTURBED: NA DISTURBED: NA		19. TOTAL NUMBER OF CORE BOXES NA
20. CHEMICAL SAMPLES CHEM: Cu/Me/PM/MS RAD: NA OTHER: —		21. TOTAL CORE RECOVERY % NA
22. DISPOSITION OF BOREHOLE DATE STARTED/INSTALLED: 03/22/10; 1045 DATE COMPLETED/ABANDONED: 03/22/10; 1145		
BACKFILL TYPE: <input type="checkbox"/> GROUT <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> TEMPORARY WELL POINT <input type="checkbox"/> MONITORING WELL		
23. NOTES BKG: ≤ Background BGS: Below Ground Surface CPM: Counts per Minute PPM: Parts per Million ▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable		

LOCATION SKETCH/COMMENTS SCALE: None



GEOLOGIST SIGNATURE/DATE Amanda Jentzen 03/22/10	QA/QC SIGNATURE/DATE KE 5/13/10	BOREHOLE NUMBER LL11SB-066
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RVAAP-44
Load Line 11
LL11sb-066

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/22/10; 1045
End Date : 03/22/10; 1145
Northing Coord. : 557856.8662
Easting Coord. : 2351664.1276
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	CL		(0.0' - 2.8') CLAY (CL); some Silt; little Sand; 10YR4/3 brown, 10YR5/6 yellowish brown, and 2.5Y6/3 light yellowish brown; soft; wet from rain; medium plasticity; (1.2' - 2.8') Stiff.	LL11sb-066-5577-SO collected from 0.0' - 1.0' on 03/22/10 at 1100 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
1				LL11sb-066-5578-SO collected from 1.0' - 4.0' on 03/22/10 at 1125 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.4'/3.0'		
2							
3	ML		(2.8' - 5.7') SILT (ML); little Clay; little fine grained Sand; little Gravel, < 1/2", subangular; 10YR4/3 brown; medium stiff; dry; low plasticity.				
4							
5	SM			LL11sb-066-5579-SO collected from 4.0' - 7.0' on 03/22/10 at 1130 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.7'/3.0'		
6			(5.7' - 9.0') Fine grained SAND and SILT (SM); little Clay; trace Gravel, <1/2", subangular; 10YR5/6 yellowish brown, 2.5Y6/1 gray, and 5Y5/3 olive; damp; silt content decreases with depth.				
7							
8	GP				1.9'/3.0'		
9			(9.0' - 12.0') GRAVEL and SAND (GP); subrounded, 1/4" Gravel coarsening downward to subangular, 1/2" Gravel; some Silt lenses; 10YR4/4 dark yellowish brown; medium dense; wet; nonplastic.	LL11sb-066-5580-SO collected from 7.0' - 13.0' on 03/22/10 at 1139 for TAL Metals + Hg, PCBs, PAHs, and Explosives.			
10							
11	SW				2.5'/3.0'		
12			(12.0' - 13.0') Fine to medium grained SAND (SW); 10YR4/4 dark yellowish brown, some 2.5Y6/1 gray; medium dense; wet.				
13			Boring terminated at 13.0 ft bgs.				Coordinate System: NAD 83

Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses.

LL11sb-066

HTRW DRILLING LOG

DISTRICT

USACE - Louisville

BOREHOLE NUMBER

LL15B-007

1. COMPANY NAME

SAIC

2. DRILLING SUBCONTRACTOR

Frontz Drilling

SHEET 1 OF 2

3. PROJECT

RVAAP PBAOS RE

4. LOCATION

RVAAP 8451 State Route 5 Ravenna, OH 44266

5. NAME OF DRILLER

JEREMY LEHRONE

6. MAKE/MODEL OF DRILL

Geoprobe 060200DT

7. SIZES AND TYPES OF SAMPLING EQUIPMENT

3' x 1' HAND AUGER
1.5" x 4' ACETATE LINER
2" x 4' DUAL TUBE

8. BOREHOLE LOCATION

N-558449.0197 E-2352819.88'

9. SURFACE ELEVATION/DATUM

NA083

10. DRILL DATE/TIME

STARTED: 0800

COMPLETED: 0900

15. DEPTH GROUNDWATER ENCOUNTERED

9.2 FT

16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION

NA

12. OVERBURDEN THICKNESS

> 13 FT

13. DEPTH DRILLED INTO BEDROCK

NA

14. TOTAL DEPTH OF BOREHOLE

13 FT

17. OTHER WATER LEVEL MEASUREMENTS (INCLUDE DATE/TIME)

NA

18. GEOTECHNICAL SAMPLES

UNDISTURBED:

DISTURBED:

19. TOTAL NUMBER OF CORE BOXES

NA

20. CHEMICAL SAMPLES

CHEM: MET/DP/PAH/RS

NA

OTHER:

21. TOTAL CORE RECOVERY %

NA

22. DISPOSITION OF BOREHOLE

DATE STARTED/INSTALLED: 03/18/10, 0800

DATE COMPLETED/ABANDONED: 03/18/10, 0900

BACKFILL TYPE:

☐ GROUT☒ BENTONITE☐ TEMPORARY WELL POINT☐ MONITORING WELL

23. NOTES

BKG: \leq Background

BGS: Below Ground Surface

CPM: Counts per Minute

PPM: Parts per Million

 ∇ : First Water Encountered \blacktriangledown : Static Water Level

NA: Not Applicable

LOCATION SKETCH/COMMENTS

SCALE: None

more
brush
vegetation

⊗ LL15B-008

⊗ LL15B-006

⊗ LL15B-007 dry
clay
grassy

slight ditch

Road

GEOLOGIST SIGNATURE/DATE

Amanda Jenton 03/18/10

QA/QC SIGNATURE/DATE

RE 5/13/10

BOREHOLE NUMBER

LL15B-007



**US Army Corps
of Engineers®**
Louisville District



RVAAP-44
Load Line 11
LL11sb-067

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/18/10; 0800
End Date : 03/18/10; 0900
Northing Coord. : 558449.0197
Easting Coord. : 2352819.88
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	CL		(0.0' - 1.4') CLAY (CL); some Silt; little/trace 1/4" - 1/2" Gravel; 10YR4/3 brown; soft; damp; low plasticity; fine roots and organics throughout.	LL11sb-067-5581-SO collected from 0.0' - 1.0' on 03/18/10 at 0820 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
1							
2	ML		(1.4' - 3.2') SILT (ML); little Clay and very fine grained Sand; 10YR5/4 yellowish brown; soft; damp, moist in sandier lenses; low plasticity.	LL11sb-067-5582-SO, LL11sb-067-6186-FD, & LL11sb-067-6190-QA collected from 1.0' - 4.0' on 03/18/10 at 0858 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	A 2.1'/3.0' B 3.0'/3.0'		
3							
4	CL		(3.2' - 5.3') CLAY (CL); some Silt; trace Gravel, 1/2", subangular; 10YR5/6 yellowish brown and 5Y7/1 light gray; stiff; low plasticity.				
5							
6	SM		(5.3' - 6.5') Very fine grained SAND (SM); some Silt; 10YR5/4 yellowish brown, 7.5Y5/6 strong brown, and 5Y7/1 light gray; dry; loose to medium dense; nonplastic.	LL11sb-067-5583-SO collected from 4.0' - 7.0' on 03/18/10 at 0850 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	2.9'/3.0'		
7	SW		(6.5' - 8.1') Fine grained SAND (SW); little very fine grained Sand; trace Silt; 10YR4/6 dark yellowish brown; loose to medium dense; dry; nonplastic.				
8							
9	ML		(8.1' - 9.2') SILT (ML); little very fine grained Sand; trace Sandstone, 1/2"; 10YR4/6 dark yellowish brown; medium stiff; damp.		2.45'/3.0'		
10	SW		(9.2' - 10.3') Medium grained SAND (SW); little Silt; 10YR4/6 dark yellowish brown some 10YR5/4 yellowish brown; wet.	LL11sb-067-5584-SO collected from 7.0' - 13.0' on 03/18/10 at 0914 for TAL Metals + Hg, PCBs, PAHs, and Explosives.			Coordinate System: NAD 83
11	ML		(10.3' - 12.1') SILT (ML); little very fine grained Sand; trace Sandstone, 1/2"; 10YR4/6 dark yellowish brown; medium stiff; damp. (10.85' - 11.0') Sandstone fragments. (11.5' - 11.7') Sandstone fragments.		2.6'/3.0'		
12	ML		(12.1' - 13.0') SILT (ML); little Sand; trace Clay; 5Y5/2 olive gray; medium stiff; damp; low plasticity.				
13			Boring terminated at 13.0 ft bgs.				

Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses.
Twin boreholes were drilled to obtain volume required for analyses.

LL11sb-067

HTRW DRILLING LOG

DISTRICT

USACE - Louisville

BOREHOLE NUMBER

LL1SB-068

1. COMPANY NAME

SAIC

2. DRILLING SUBCONTRACTOR

Frontz Drilling

SHEET 1 OF 2

3. PROJECT

RUNOFF PPH 08 BE

4. LOCATION

RVAAP 8451 State Route 5 Ravenna, OH 44266

5. NAME OF DRILLER

JEREMY LECKRONE

6. MAKE/MODEL OF DRILL

Geoprobe 0020 DT

7. SIZES AND TYPES OF SAMPLING EQUIPMENT

3" x 1" HAND AUGER
1.5" x 4" ACETATE LINER
2" x 4" DUAL TUBE

8. BOREHOLE LOCATION

N-558 552.3077 E-2352812.7580

9. SURFACE ELEVATION/DATUM

1110.83

10. DRILL DATE/TIME

STARTED: 0920

COMPLETED: 1040

15. DEPTH GROUNDWATER ENCOUNTERED

7.5'

16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION

NA

12. OVERBURDEN THICKNESS

>13 FT

13. DEPTH DRILLED INTO BEDROCK

NA

14. TOTAL DEPTH OF BOREHOLE

>13 FT

17. OTHER WATER LEVEL MEASUREMENTS (INCLUDE DATE/TIME)

NA

18. GEOTECHNICAL SAMPLES

UNDISTURBED: —

DISTURBED: —

19. TOTAL NUMBER OF CORE BOXES

NA

20. CHEMICAL SAMPLES

CHEM: FUSITE

RAD: NA

OTHER: —

21. TOTAL CORE RECOVERY %

NA

22. DISPOSITION OF BOREHOLE

DATE STARTED/INSTALLED: 03/18/10, 0920

DATE COMPLETED/ABANDONED: 03/18/10, 1040

BACKFILL TYPE:

☐ GROUT

☒ BENTONITE

☐ TEMPORARY WELL POINT

☐ MONITORING WELL

23. NOTES

BKG: ≤ Background

BGS: Below Ground Surface

CPM: Counts per Minute

PPM: Parts per Million

▽ : First Water Encountered

▼ : Static Water Level

NA: Not Applicable

LOCATION SKETCH/COMMENTS

SCALE: None

MOORE
BRUSH
VEGETATION

⊗ LL1SB-068

↑ SLOPE
UPWARD

⊗ LL1MW-006

⊗ LL1SB-067

dry
clear
grassy

SLIGHT DITCH

ROAD

GEOLOGIST SIGNATURE/DATE

Amanda Hunter 03/18/10

QA/QC SIGNATURE/DATE

R.E.D. 5/13/10

BOREHOLE NUMBER

LL1SB-068



**US Army Corps
of Engineers®**
Louisville District



RVAAP-44
Load Line 11
LL11sb-068

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : Geoprobe 6620DT
Type of Drill Rig : Direct Push Technology
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 2"
Sampling Equipment : 1.5" x 4' Long Acetate Liner
: 2" x 4' Dual Tube
: 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/18/10; 0920
End Date : 03/18/10; 1040
Northing Coord. : 558552.3077
Easting Coord. : 2352812.7580
Total Depth of Boring : 13.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	CL		(0.0' - 1.5') CLAY (CL); some Silt; little 1/4" - 2" Gravel; 10YR4/3 brown; soft; damp; medium plasticity; roots and organics throughout.	LL11sb-068-5585-SO collected from 0.0' - 1.0' on 03/18/10 at 0935 for VOCs, SVOCs, PCBs, Pesticides, Explosives, Propellants, and TAL Metals + Hg.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
1							
2	ML		(1.5' - 2.7') SILT (ML); trace Clay and 1/2" Gravel; 10YR4/4 dark yellowish brown; soft; damp; medium plasticity.	LL11sb-068-5586-SO and MS/MSD collected from 1.0' - 4.0' on 03/18/10 at 1010 for VOCs, SVOCs, PCBs, Pesticides, Explosives, Propellants, and TAL Metals + Hg.	A 1.9'/3.0' B 2.6'/4.0'		
3	ML		(2.7' - 3.25') SILT (ML); some Gravel and coarse Sand; dark red brown and 10YR5/6 yellowish brown; loose; crumbly; dry.				
4	ML		(3.25' - 4.3') SILT (ML); some very fine grained Sand; little Clay; 10YR5/6 yellowish brown; soft; damp; medium plasticity.				
5			(4.3' - 4.4') Gravel.				
6			(4.4' - 10.5') Medium to fine grained SAND (SW); 7.5YR4/6 strong brown; loose; damp to moist; nonplastic.	LL11sb-068-5587-SO, LL11sb-068-6187-FD, & LL11sb-068-6191-QA collected from 4.0' - 7.0' on 03/18/10 at 1015 for VOCs, SVOCs, PCBs, Pesticides, Explosives, Propellants, and TAL Metals + Hg.	A 2.6'/3.0' B 2.4'/3.0' C 2.2'/3.0' D 2.0'/3.0'		
7			(6.6' - 6.8') Clayey Sand; 5Y7/1 light gray.				
8	SW		(7.5' - 10.0') Wet. Fining downward.		2.55'/3.0'		
9							
10				LL11sb-068-5588-SO collected from 7.0' - 13.0' on 03/18/10 at 1035 for VOCs, SVOCs, PCBs, Pesticides, Explosives, Propellants, and TAL Metals + Hg.			
11	SM		(10.5' - 12.6') SILT and very fine grained SAND (SM); 10YR4/6 dark yellowish brown; medium dense; wet; nonplastic.		3.0'/3.0'		
12							
13	ML		(12.6' - 13.0') SILT (ML); little Sand; 2.5Y5/1 gray; medium dense; wet; low plasticity.				
			Boring terminated at 13.0 ft bgs.				Coordinate System: NAD 83

Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses except VOCs.
Twin boreholes were drilled to obtain volume required for analyses.

LL11sb-068

HTRW DRILLING LOG		DISTRICT USACE - Louisville	BOREHOLE NUMBER LL115B-009
1. COMPANY NAME SAIC		2. DRILLING SUBCONTRACTOR Frontz Drilling	
3. PROJECT RVAAP PBH 08 BT		4. LOCATION RVAAP 8451 State Route 5 Ravenna, OH 44266	
5. NAME OF DRILLER JEREMY L. LEVINSKY		6. MAKE/MODEL OF DRILL Geoprobe 6020 DT in situ	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT 3" x 1" HAND AUGER		8. BOREHOLE LOCATION 557992.3649 E 2353800.9242	
		9. SURFACE ELEVATION/DATUM NAD83	
		10. DRILL DATE/TIME 03/22/10 STARTED: 1330 COMPLETED: 1440	
		15. DEPTH GROUNDWATER ENCOUNTERED NA	
12. OVERBURDEN THICKNESS 5+ FT		16. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION NA	
13. DEPTH DRILLED INTO BEDROCK NA		17. OTHER WATER LEVEL MEASUREMENTS (INCLUDE DATE/TIME) NA	
14. TOTAL DEPTH OF BOREHOLE 5 FT			
18. GEOTECHNICAL SAMPLES UNDISTURBED: NA DISTURBED: NA		19. TOTAL NUMBER OF CORE BOXES NA	
20. CHEMICAL SAMPLES CHEM: EX/NO/DA/RE/AD: NA OTHER: _____		21. TOTAL CORE RECOVERY % NA	
22. DISPOSITION OF BOREHOLE DATE STARTED/INSTALLED: 03/22/10; 1330 DATE COMPLETED/ABANDONED: 03/22/10; 1440			
BACKFILL TYPE: <input type="checkbox"/> GROUT <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> TEMPORARY WELL POINT <input type="checkbox"/> MONITORING WELL			
23. NOTES BKG: ≤ Background BGS: Below Ground Surface CPM: Counts per Minute PPM: Parts per Million ▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable			
LOCATION SKETCH/COMMENTS			SCALE: None
GEOLOGIST SIGNATURE/DATE Amanda Jenton 03/22/10		QA/QC SIGNATURE/DATE KE 5/13/10	
		BOREHOLE NUMBER LL115B-009	



RVAAP-44
Load Line 11
LL11sb-069

Drilling Company : Frontz Drilling
Driller : Jeremy Leckrone
Designation of Drill : NA
Type of Drill Rig : NA
Geologist : Amanda Trenton
Oversight Company : SAIC
Borehole Diameter : 3"
Sampling Equipment : 3" Hand Auger

RVAAP PBA 2008 Remedial Investigation
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266
Portage County

Start Date : 03/22/10; 1330
End Date : 03/22/10; 1440
Northing Coord. : 557992.3609
Easting Coord. : 2353600.9242
Total Depth of Boring : 5.0 ft

Depth in feet	USCS Symbol	USCS Graphic	Description	Analyses	Recovery	Collection Interval	Comments
0	ML		(0.0' - 0.5') SILT (ML); 10YR3/2 very dark grayish brown; soft; wet from water flowing in ditch; significant organics throughout.	LL11sb-069-5589-SO collected from 0.0' - 1.0' on 03/22/10 at 1350 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		Soil Color Chart Munsell 2000 Rev. Ed.
	CL		(0.5' - 1.0') CLAY (CL); some Silt; some fine to medium grained Sand; 10YR4/3 brown, 7.5YR6/8 reddish yellow, and 2.5Y6/1 gray; damp to wet from surface water.				
1			(1.0' - 4.0') SILT and SAND (SM); little Gravel 1/2" - 3.0" subrounded to subangular; 2.5Y5/3 light olive brown and 10YR5/6 yellowish brown; medium dense; dry to damp.	LL11sb-069-5590-SO collected from 1.0' - 4.0' on 03/22/10 at 1404 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	3.0'/3.0'		
2	SM						
3				LL11sb-069-5591-SO collected from 4.0' - 5.0' on 03/22/10 at 1428 for TAL Metals + Hg, PCBs, PAHs, and Explosives.	1.0'/1.0'		
4	ML		(4.0' - 5.0') SILT (ML); some Clay; little fine grained Sand, mostly in lenses; 10YR5/3 brown; stiff; damp from surface water; high plasticity; clay content increases with depth.				
5			Boring terminated at 5.0 ft bgs. Hand auger refusal.				Coordinate System: NAD 83

Boring backfilled with sodium bentonite chips and hydrated.
0.0' - 1.0' sampled using a 3" hand auger and triangular subsample procedure for explosives as presented in Section 4.5.2.1.1 of the Facility-wide SAP.
Samples were composited and homogenized for all analyses.

LL11sb-069

SURFACE WATER AND SEDIMENT SAMPLES

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RVAAP PBA08 RI - Surface Water and Wet Sediment Sample Log

USACE - Louisville

RVAAP 8451 State Rt. 5
Ravenna, OH 44266

1. COMPANY NAME: SAIC

2. PROJECT: RVAAP PBA 2008 RI
3. Sample Team: Mike Denallo
Emily Cunningham

SHEET 1 OF 12

4. LOCATION ID: LL11sw/scl-082

5. Coordinates Recorded: NA

5. Surface Water Equipment Used: N/A

SAMPLE TYPE: GRAB

6. Sample ID and Time: LL11SW-082-5608-SW; 1030

7. Dupe ID (if needed)

8. MS/MSD ID (if needed)

9. Split ID (if needed)

10. Wet Sediment Equipment Used: Hand Push Probe

SAMPLE TYPE: Composite, VOCs - Grab Composite

11. Sample ID: LL11SD-082-5593-SD; 1030

12. Dupe ID (if needed)

13. MS/MSD ID (if needed)

14. Split ID (if needed)

Weather Conditions: 32°F, snow, cloudy

Activities in the Area: NONE

LOCATION SKETCH/COMMENTS

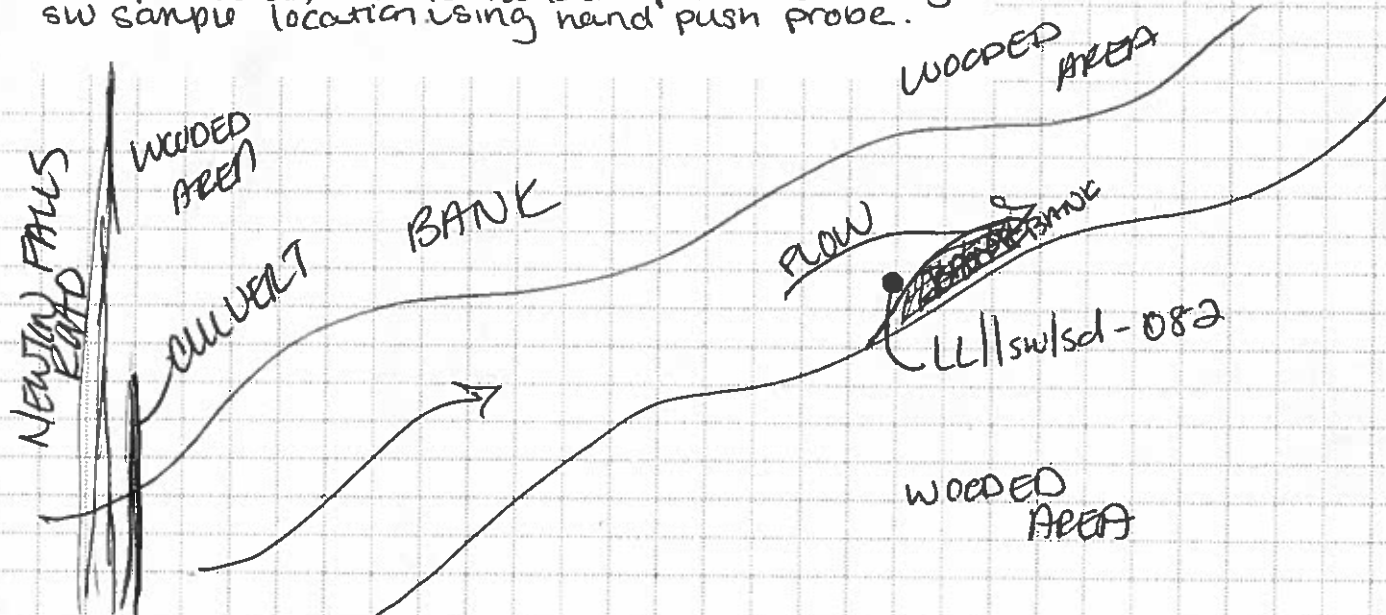
SCALE: None

Field Notes: Moved GPS location downstream to obtain the sample safely. New location was GPS'd and saved as Northing: 558938.67 ft and Easting: 2352492.76 ft.



SEDIMENT: BILLY SAND (SC). some Gravel, little clay; dark brown yellowish brown 104R 414; loose; not plastic; some organics (roots, leaves).

samples taken at 10 random points 5' away from SW sample location using hand push probe.



SURFACE WATER ANALYSES:

☒ EXPLOSIVES ☒ TAL METALS ☒ SVOCs ☒ OTHER VOCs
☒ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

WET SEDIMENT ANALYSES:

☒ EXPLOSIVES ☒ TAL METALS ☒ SVOCs ☒ OTHER VOCs
☒ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

Recorded By:

Emily Cunningham
(Signature and Date) 02-24-2010

QC Checked by:

REJ 2-24-10
(Signature and Date)

SAMPLE LOG SHEET

PROJECT NAME: RVAAP PBA08 RI

PROJECT NO: 172819.00.09456.00.9200.02.200

SAMPLING LOCATION: 4411SW-Ø82 DATE COLLECTED (MM/DD/YY): 03/16/10TIME: 1235SAMPLE TEAM: STEVE VISOCKY, SARA HISEWEATHER: SUNNY, 45°F ACTIVITIES IN AREA: NONE

FIELD OBSERVATIONS (i.e. Water color, odor, flow....):

MODERATE FLOW, 4-6" DEEP AT SAMPLE LOCATION. SLIGHT GRAYISH
TINGE. SMALL ROCKS AND SEDIMENT ON BOTTOM OF DITCH. SOME
ALGAE GROWTH.

PHOTOGRAPH ID(S): N/A

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
TEMPERATURE:	5.94	°C	15560	03/16/10
pH:	7.52	S.U	↓	↓
CONDUCTIVITY:	0.075	mS/cm	↓	↓
DO:	10.01	mg/L	↓	↓
TURBIDITY:	9.33	NTU	15559	↓
OTHER _____			SV 3/16/10	

Recorded By: Sara Hise
(Signature)QC Checked by: Steve Visocky 3/16/10
(Signature)

RVAAP PBA08 RI - Surface Water and Wet Sediment Sample Log

USACE - Louisville

2. PROJECT: RVAAP PBA 2008 RI

RVAAP 8451 State Rt. 5
Ravenna, OH 44266

1. COMPANY NAME: SAIC

3. Sample Team *Emily Cunningham*
Steve Visaly

SHEET 1 OF 2

4. LOCATION ID: *LL11SW-083 + LL15d-083*

5. Coordinates Recorded: *N: 40°17'10.27" E: 235°17'12.24"*
Elev: 974.66'

5. Surface Water Equipment Used: *Sample Bottles (unpreserved)*

SAMPLE TYPE: *Grab*

6. Sample ID and Time

LL11SW-083-5609-SW 0927

7. Dupe ID (if needed)

NA

8. MS/MSD ID (if needed)

LL11SW-083-5609-MS/MSD 0927

9. Split ID (if needed)

NA

10. Wet Sediment Equipment Used: *SS. Push Probe + SS Bowl*

SAMPLE TYPE: *Grab SV Composite, VOS Grab*

11. Sample ID

SS94-SD

12. Dupe ID (if needed)

2/25/10

LL11SW-083-5609-SW 2/25/10 1005

13. MS/MSD ID (if needed)

NA

14. Split ID (if needed)

NA

Weather Conditions: *Overcast 28°F Light Snow*

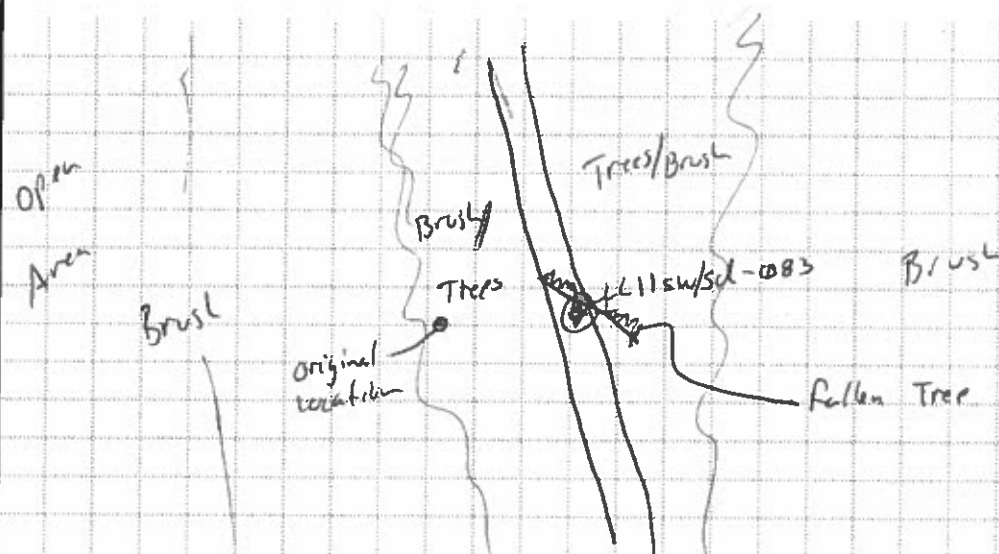
Activities in the Area *None*

LOCATION SKETCH/COMMENTS

SCALE: None

Field Notes: *SILT (ML), Little Clay, Trace Sand, Trace Gravel,
light Gray 10YR 7/2, Soft, moist, low plasticity,
organic material (DK. Grayish Brown 10YR 4/2), Yellowish
brown 10YR 5/6 iron staining
Very low flow surface water*

*relocated collection point into ditch.
Need to re collect GPS point. (collected on 3/9/10)*



SURFACE WATER

ANALYSES:

- ☐ EXPLOSIVES ☐ TAL METALS ☐ SVOCs ☐ OTHER _____
☒ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

WET SEDIMENT

ANALYSES:

- ☐ EXPLOSIVES ☐ TAL METALS ☐ SVOCs ☐ OTHER _____
☒ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

Recorded By:

St. V. 2/25/10
(Signature and Date)

QC Checked by:

[Signature] 2/24/2010
(Signature and Date)

SAMPLE LOG SHEET

PROJECT NAME: RVAAP PBA08 RI

PROJECT NO: 172819.00.09456.00.9200.02.200

SAMPLING LOCATION: LL11-SW-083 DATE COLLECTED (MM/DD/YY): 03/14/14TIME: 1200SAMPLE TEAM: STEVE VISOCKY, SAAA HHSWEATHER: SUNNY, 45°F ACTIVITIES IN AREA: NONE

FIELD OBSERVATIONS (i.e. Water color, odor, flow...):

CLEAR, NO FLOW. ~2" DEEP. NO ODOR. LEAVES AND OTHER ORGANIC
DEBRIS AND SEDIMENT ON BOTTOM OF DITCH.

SH

PHOTOGRAPH ID(S): LL11-SW-001

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
TEMPERATURE:	8.41	°C	15560	03/16/14
pH:	7.24	S.U	↓	↓
CONDUCTIVITY:	0.317	mS/cm	↓	↓
DO:	3.45	mg/L	↓	↓
TURBIDITY:	3.20	NTU	15559	↓
OTHER _____	_____	_____	_____	_____

Recorded By: Steve Visocky
(Signature)

QC Checked by:

Steve Visocky 3/16/14
(Signature)

RVAAP PBA08 RI - Surface Water and Wet Sediment Sample Log

USACE - Louisville

RVAAP 8451 State Rt. 5
Ravenna, OH 44266

1. COMPANY NAME: SAIC

2. PROJECT: RVAAP PBA 2008 RI

3. Sample Team *Emily Cunningham*
Steve Visocky

SHEET 1 OF 12

4. LOCATION ID: LL11sd-084 + LL11sw-084

5. Coordinates Recorded: NA

6. Surface Water Equipment Used: *Sample Bottles (unpreserved)*

SAMPLE TYPE: *Grab*

6. Sample ID and Time

LL11sw-084-5610-SW 10570

7. Dupe ID (if needed)

NA

8. MS/MSD ID (if needed)

NA

9. Split ID (if needed)

NA

10. Wet Sediment Equipment Used: *SS Push Probe + SS Bowl*

SAMPLE TYPE: *Grab + Composite, VOC - grab*

11. Sample ID

LL11sd-084-5595-SD 1112

12. Dupe ID (if needed)

NA

13. MS/MSD ID (if needed)

NA

14. Split ID (if needed)

NA

Weather Conditions: *Overcast, 20°F, Light Snow*

Activities in the Area *None*

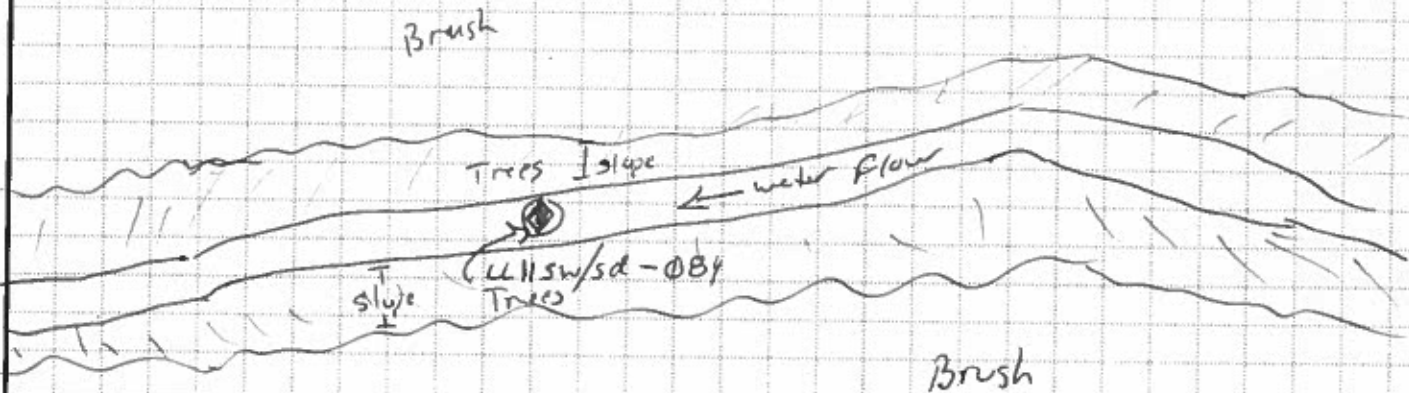
LOCATION SKETCH/COMMENTS

SCALE: None

Field Notes: Silt (SC), some clay, little sand, trace fine gravel, light grayish brown 10YR 6/2, very soft - soft, moist, low plasticity, organic matter (very dark gray 10YR 3/1), yellowish brown 10YR 5/6 iron staining, root casts, organic odor.

Flowing water

LL11sw-084
⊕



SURFACE WATER ANALYSES:

- ☐ EXPLOSIVES ☐ TAL METALS ☐ SVOCs ☐ OTHER
☒ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

WET SEDIMENT ANALYSES:

- ☒ EXPLOSIVES ☒ TAL METALS ☒ SVOCs ☒ OTHER *VOCs*
☐ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

Recorded By:

St. Viny 2/25/10
(Signature and Date)

QC Checked by:

[Signature] 2/26/2010
(Signature and Date)

SAMPLE LOG SHEET

PROJECT NAME: RVAAP PBA08 RI

PROJECT NO: 172819.00.09456.00.9200.02.200

SAMPLING LOCATION: LL11SW-084 DATE COLLECTED (MM/DD/YY): 03/16/16TIME: 1215SAMPLE TEAM: STEVE VISOCKY, SARAHISEWEATHER: SUNNY, 45°F ACTIVITIES IN AREA: NONE

FIELD OBSERVATIONS (i.e. Water color, odor, flow....):

CLEAR WHITE SHEEN ON WATER. MODERATE FLOW. DEPTH IS ~3".
ORGANIC DEBRIS ON BOTTOM OF DITCH. NO ODR. SOME GREEN ALGAE
GROWTH. SEDIMENT ON BOTTOM.

PHOTOGRAPH ID(S): LL11-SW-002

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
TEMPERATURE:	7.39	°C	15564	03/16/16
pH:	7.37	S.U	↓	↓
CONDUCTIVITY:	0.192	mS/cm	↓	↓
DO:	8.10	mg/L	↓	↓
TURBIDITY:	8.20	NTU	15559	↓
OTHER			2	

3/16/16

Recorded By: Sarah Nise 3/16/16
(Signature)QC Checked by: Steve Visocky 3/16/16
(Signature)

AUGUST 2012 SAMPLING

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RVAAP - Surface Water & Wet Sediment Field Form

SHEET

1

OF

1

USACE - Louisville

RVAAP 8451 State Rt. 5
Ravenna, OH 442661. Sample Team: KATIE WELLS
AMANDA TRENTON

2. Location ID:

LL11SD-096

3. Revised Coordinates Recorded:

N 41°11'19.90407" W: 81°06'23.74174"

4. Surface Water Sample ID:

NA

5. Date and Time:

NA

6. Dupe ID (if needed):

NA

7. Split ID (if needed):

NA

8. Surface Water Sample Type and Equipment Used:

NA - DITCH IS DRY

9. MS/MSD: NA

10. Wet Sediment Sample ID:

LL11SD-096-5874-SD

11. Date and Time:

08/09/12; 1520

12. Dupe ID (if needed):

NA

13. Split ID (if needed):

NA

14. Wet Sediment Sample Type and Equipment Used:

3/8" SS PUSH PROBE

15. MS/MSD: NA

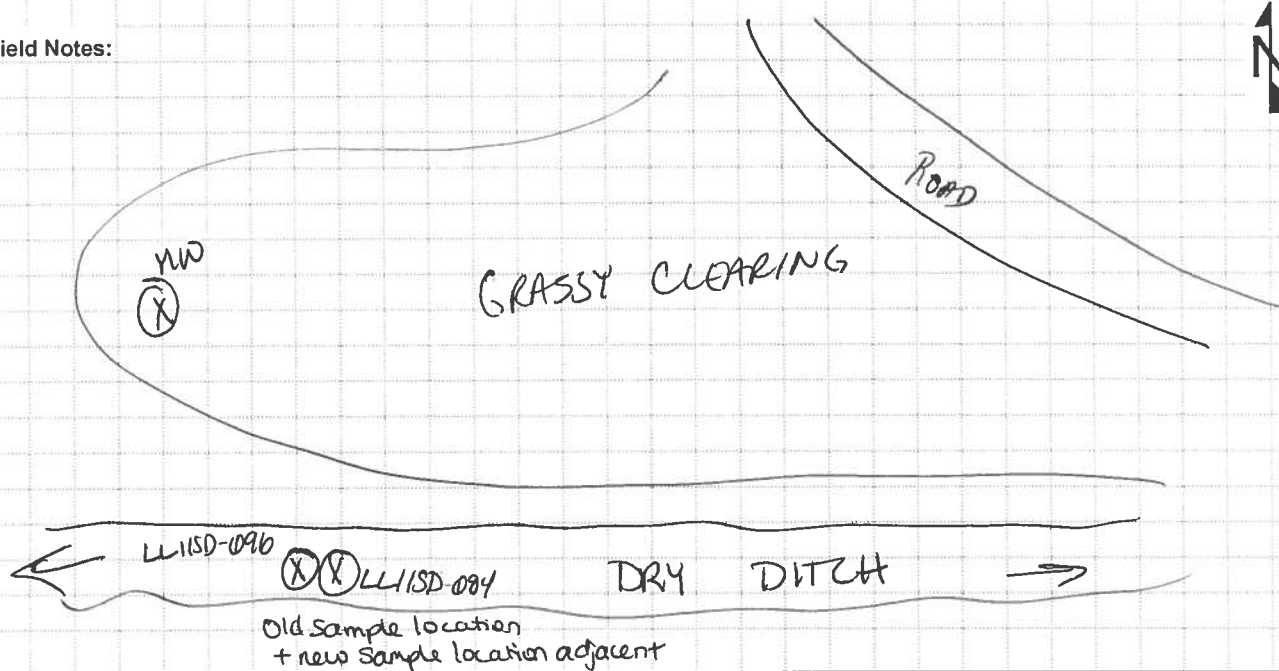
16. Weather Conditions: 70°F; RAIN

17. Activities in the Area: NONE

LOCATION SKETCH/COMMENTS

SCALE: None

Field Notes:



FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
TEMPERATURE:		°C		
pH:		S.U.		
CONDUCTIVITY:		mS/cm		
DO:		mg/L		
TURBIDITY:		NTU		
OTHER _____:				

SURFACE WATER
ANALYSES:

- ☐ EXPLOSIVES ☐ TAL METALS ☐ SVOCs ☐ OTHER _____
☐ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

WET SEDIMENT
ANALYSES:

- ☐ EXPLOSIVES ☐ TAL METALS ☐ SVOCs ☐ OTHER _____
☒ FULL SUITE (VOCs, SVOCs, Metals, Explosives, Propellants, Pesticides, PCBs)

Recorded By:

Amanda Trenton
(Signature and Date) 08/09/12

QC Checked by:

Katie Wells 10/17/12
(Signature and Date)

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